AD-A038 719 AIR FORCE PACKAGING EVALUATION AGENCY WRIGHT-PATTERSO--ETC F/G 13/4
M-16 WEAPONS CONTAINER VIBRATION AND ROUGH HANDLING TESTS,(U)
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PTPD REPORT NO. 77-11
AFPEA PROJECT NO. 76-P7-36

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M-16 WEAPONS CONTAINER

VIBRATION AND ROUGH HANDLING TESTS

AFALD/PTPD
AIR FORCE PACKAGING EVALUATION AGENCY
Wright-Patterson AFB OH 45433

APRIL 1977

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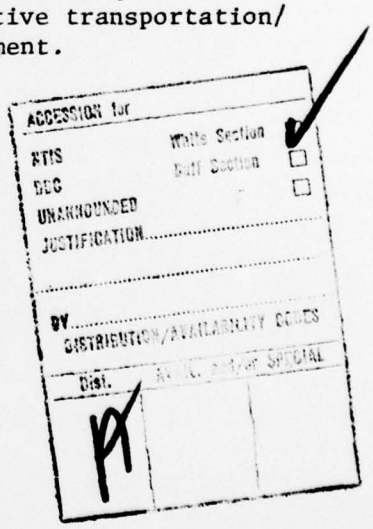
ABSTRACT

The 182d TAC Reserve requested the Air Force Packaging Evaluation Agency (AFPEA) perform testing on a proposed mobility container. This container is not intended to replace the presently used TPO pack, but to be used only as a transportation/storage rack for their mobility exercises. This container is designed to accommodate ten M-16 weapons and their accessories. The AFPEA developed a test plan to conduct the standard rough handling and vibration tests that would simulate the conditions experienced by this container for the specialized environment specified.

During the first test sequence, the container failed to protect the weapons, in particular the restraint clip used to keep the weapon from being fired "fully automatic." The second test sequence was conducted on weapons that had this clip removed as would be likely in actual practice. In this instance, the container provided adequate protection to the weapons and should prove to be an effective transportation/storage container to be used in a rapid mobility environment.



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April 1977

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INTRODUCTION

The M-16 mobility container as shown in Figure 2, page 7, was shipped from 182d TAC Reserve, Peoria IL in late July 1976. The container test plan, as shown in Figure 1, page 5, was to be followed. Where applicable, test limits were determined using Level B requirements as defined in FTMS 101B. The interior container, shown in Figure 3, page 7, was proposed by the TAC Reserve as an alternate method of deploying weapons used on mobility exercises. The current method of shipment is by use of the Transportation Packing Order (TPO) pack which is awkward and has loose dunnage and packing material associated with it. The TPO pack is, of course, approved for all Level A, B, and C shipments but since the mobility requirements of TAC fit into the Level B category, a specialized container is a good possibility for investigation. The proposed container has no separate parts other than the rack and exterior shipping container.

TEST OUTLINE: Sequence I

The following test was performed on the subject container, in accordance with Federal Test Method Standard 101B, on 12 August 1976.

Vibration test (Method 5019) 1" double amplitude, 4.3 Hz input frequency, 1G input repetitive shock, two hour running time.

RESULTS: Initial placement of the weapons within the container sheared one mode selector restraint clip. This clip can be seen in inset B of Figure 4, page 8, and is pointed out by the arrow in Figure 5, page 8. The weapon with pin sheared is shown in inset A of Figure 4 and on the weapon on the left in Figure 5. The actual vibration test sheared off another two clips. Five more clips were broken during weapon removal, inspection, and replacement. Testing was terminated until this problem was resolved. Figures 6, 7, and 8, pages 9 and 10, show the inner container being loaded.

TEST OUTLINE: Sequence II

The following tests were performed on the subject container on 20 January 1977. During this test, the weapons did not have the mode restraint clip which caused the majority of difficulty in the first test sequence.

TEST #	TEST	FTMS METHOD	CONTAINER	ORIENTATION
A1	Vibration	5019	I-1	
B1-1	Cornerwise Drop	5005	I-2	Forward end
B2-1	Edgewise Drop	5008	I-2	Forward end
B1-2	Cornerwise Drop	5005	I-2	Diag. opposite B1-1
B2-2	Edgewise Drop	5008	I-2	At end
B3-1	Pendulum Impact	5012	I-2	Forward end
B3-2	Pendulum Impact	5012	I-2	Aft end
B3-3	Pendulum Impact	5012	I-2	Right side
B3-4	Pendulum Impact	5012	I-2	Left side

TEST PROCEDURE AND RESULTS

1. Vibration (Test # A1). The equipment used to conduct vibration testing was a L.A.B. Vibration Machine, serial 56801, type 5000-96B. The basic vibration platform was fitted with a table adapter constructed of plywood measuring 96" long by 96" wide by 1.5" thick bolted to the original vibration table. The container was vibrated on this platform at 4.5 Hz for 2.0 hours. The 4.5 Hz was selected as the vibration frequency because at this point, the container was receiving a 1G shock from the 1" double amplitude displacement.

There was no damage visible to the container. Inspection of the contents after the vibration test showed that none of the ten weapons received damage.

2. Cornerwise Drop (Test #B1). One corner of the base was supported on a block nominally 6" high and a block nominally 12" high was placed under the other corner of the same end. These blocks provided a condition where there was no support for the base between the ends of the container during the drop. The unsupported end of the base was raised so that the lower corner of the base was raised 24". The container was then released and allowed to impact the concrete floor. This test was applied to two diagonally opposite corners of the base of the container.

No container damage was noted at the conclusion of this test.

3. Edgewise Drop (Test #B2). The container was placed on its bottom with one end of the base of the container supported on a sill nominally 6" high. This height assured that there was no support of the base between the end of the container during dropping. The unsupported end of the container was then raised to a height of 24" and released for impact. This test was applied to each end of the container.

At the conclusion of the drop test sequence, there was no visable damage recorded nor any signs of internal damage.

4. Pendulum Impact (Test #B3). The container was placed on the platform with the impact end extending over the edge of the platform just enough to make contact with the concrete bumper. The platform was then pulled back so that the center of gravity of the container was raised 9". Upon release, the platform then swung to impact the concrete bumper with an impact velocity of 7 fps. This procedure was followed for testing both ends and both sides of the container.

Usual inspection of the container revealed no damage at the conclusion of this test. The container was then opened and the weapons inspected. Again, the weapons sustained no damage. The container, therefore, provided adequate protection throughout all phases of testing.

DISCUSSION

The second test sequence has shown the container concept tested to be adequate to provide protection such as required by Level B and C. The problem encountered during the first test sequence was mainly due to the shearing of the mode selector restraints. In actual practice, these restraints probably would not be used in mobility exercises. In that case, there should be no damage to the weapons resulting from use of the subject container.

This design is in no way meant to replace the current TPO package. There should be no problem in using the container tested as long as the TPO pack is used for all routine logistic shipments.

AIR FORCE PACKAGING EVALUATION AGENCY
(Container Test Plan)

AFPEA PROJECT NUMBER: 76-P7-36

CONTAINER SIZE	(GROSS) WT (ITEM)	CUBE	QUANTITY	DATE
49"x39"x12 3/4"	167	14.1 cu ft	1 (10 weapons)	

ITEM NAME	MANUFACTURER
M-16 Weapon	Supplied by 182 TAC Peoria IL
CONTAINER NAME Mobility Weapon Deployment Container	**CONTAINER COST** Prototype

PACK DESCRIPTION
Metal Rack With Cleated Plywood Overpack

CONDITIONING

TEST NO.	IAW	PARAMETERS	ORIENTATION	INSTRUMENTED
A-1	Meth 5020 FTMS 101B	1" Double AMP 4.5 Hz		Yes
B-1	Meth 5005 FTMS 101B	24" Drop Height	Diag Opposite Corners	Yes
B-2	Meth 5008 FTMS 101B	24" Drop Height	Opposite Ends	Yes
B-3	Meth 5012 FTMS 101B	7 FPS Impact	Each End and Side	Yes
A-2	Meth 5020 FTMS 101B	1" Double AMP 4.5 Hz		Yes

COMMENTS

PREPARED BY	APPROVED BY
R.T. GIBBONS/PTPD	RALPH ZYNDA, Chief Design Division

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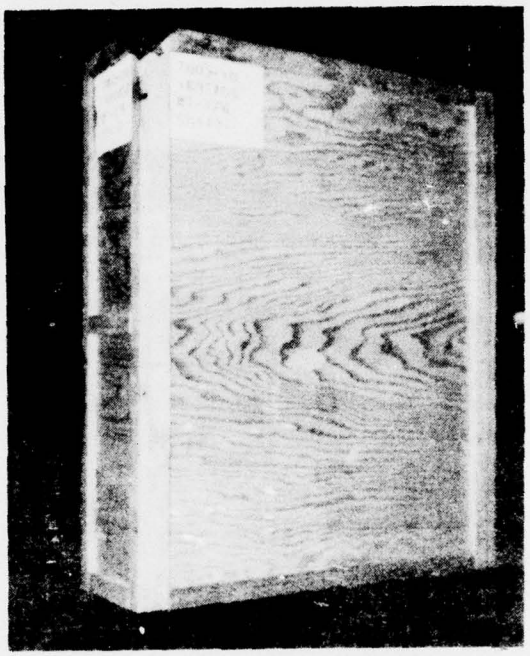

FIGURE 2. M-16 SHIPPING CONTAINER

FIGURE 3. M-16 LOADED INTERIOR RACK

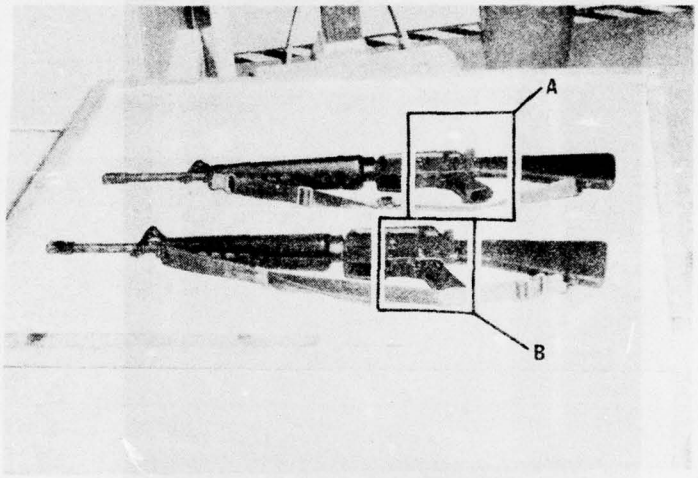

FIGURE 4. CLIP AND MODE SELECTOR

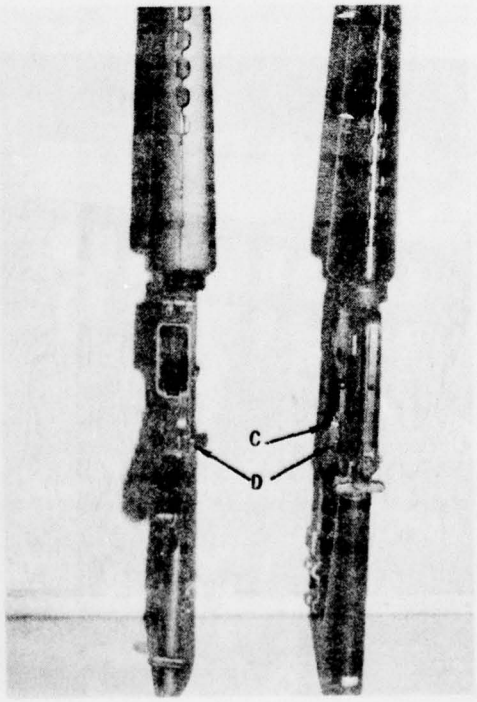

FIGURE 5. WEAPON PROBLEM AREA

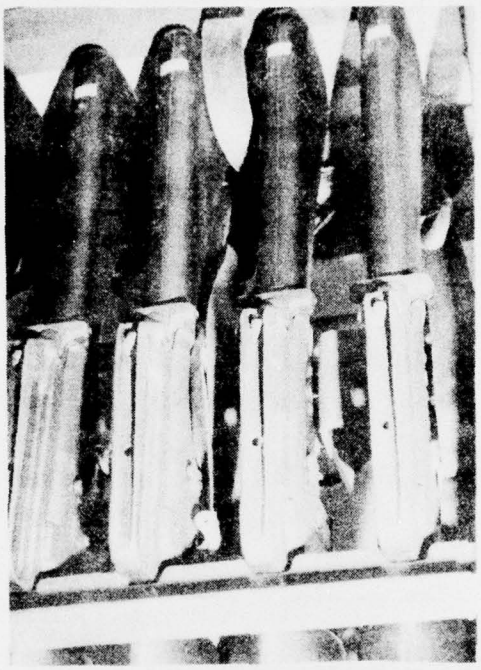

FIGURE 6. WEAPONS LOADED, LOWER VIEW

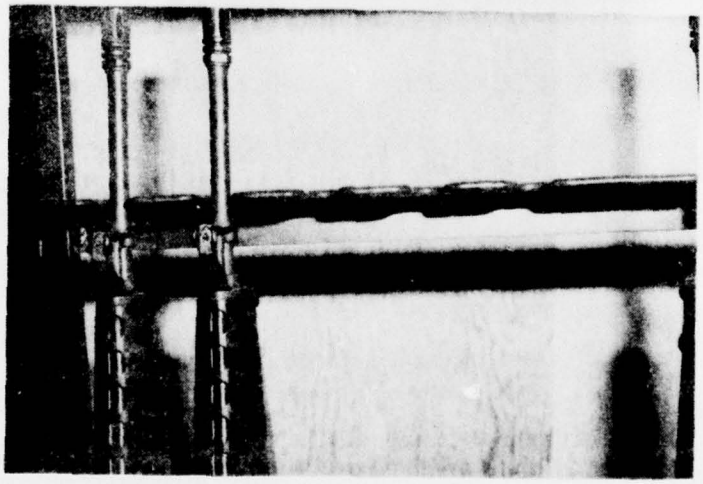

FIGURE 7. WEAPONS LOADED, UPPER VIEW

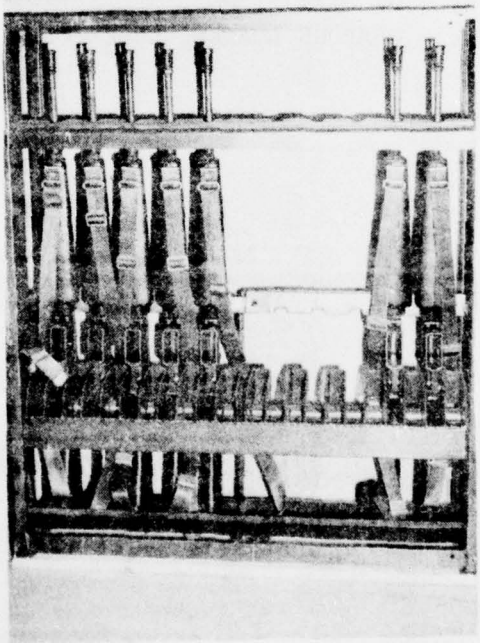

FIGURE 8. PARTIALLY LOADED RACK

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER PTPD REPORT NO. 77-11	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* M-16 WEAPONS CONTAINER VIBRATION AND ROUGH HANDLING TESTS		5. TYPE OF REPORT & PERIOD COVERED Test Data (14) PTPD-77-11
		6. PERFORMING ORG. REPORT NUMBER AFPEA PROJ NO. 76-P7-36
7. AUTHOR(s) RICHARD T. GIBBONS Mechanical Engineer		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS AFALD/PTPD Wright-Patterson AFB OH 45433		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS AFALD/PTPD Wright-Patterson AFB OH 45433		12. REPORT DATE APRIL 1977 13. NUMBER OF PAGES 20
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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The 182d TAC Reserve requested the Air Force Packaging Evaluation Agency (AFPEA) perform testing on a proposed mobility container. This container is not intended to replace the presently used TPO pack, but to be used only as a transportation/storage rack for their mobility exercises. This container is designed to accommodate ten M-16 weapons and their accessories. The AFPEA developed a test plan to conduct the standard rough handling and vibration tests that would simulate the conditions experienced by this container for the specialized (Cont

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20. ABSTRACT (Cont'd)

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